FORM PTO-	-1390 U.S. DEPARTMENT OF CO	ATTORNEY'S DOCKET NO. PHD 99,060				
TRANSMI	ITTAL LETTER TO THE UNITE (DO/EO/US) CONCERNING A	U.S. Application No. (if known, see 37 CER 1.5)				
INTERNATION PCT/EP00/0	ONAL APPLICATION NO. 04607	INTERNATIONAL FILING DATE MAY 17, 2000	PRIORITY DATE CLAIMED MAY 18, 1999			
TITLE OF IN SENSOR M						
APPLICANT FALKO BUS	T(S) FOR DO/EO/US SSE, MICHAEL OVERDICK, WALT	ER RUTTEN, MARTIN JOHN POWELL				
Applicant(s	s) herewith submit to the United S	tates Designated/Elected Office (DO/EO/US) the f	following items and other information:			
1. [X]	This is a FIRST submission of iten	ns concerning a filing under 35 U.S.C. 371.				
2	This is a SECOND or SUBSEQUE	NT submission of items concerning a filing under	35 U.S.C. 371.			
3([X])	This express request to begin nat examination until the expiration c 39(1).	ional examination procedures (35 U.S.C. 371(f)) a of the applicable time limit set in 35 U.S.C. 371(b)	t any time rather than delay and PCT Articles 22 and			
4. []	A proper Demand for Internationa	l Preliminary Examination was made by the 19th	month from the earliest claimed priority date.			
	A copy of the International Application as filed (35 U.S.C. 371 (c)(2)) a. [X] is transmitted herewith (required only if not transmitted by the International Bureau). b. [] has been transmitted by the International Bureau. c. [] is not required, as the application was filed in the United States Receiving Office (RO/US).					
6. []	A translation of the International	Application into English (35 U.S.C. 371(c)(2))				
	Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) a. [] are transmitted herewith (required only if not transmitted by the International Bureau). b. [] have been transmitted by the International Bureau. c. [] have not been made; however, the time limit for making such amendments has NOT expired. d. [] have not been made and will not be made.					
8. []	A translation of the amendment to	o the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).			
9. [X]	An oath or declaration of the inve	ntor(s) (35 U.S.C. 371(c)(4)).				
10.[]	A translation of the annexes to th	e International Preliminary Examination Report u	nder PCT Article 36 (35 U.S.C. 371(c)(5)).			
Items 11. t	to 16. below concern document(s)	or information included:				
11. [X]	An Information Disclosure Staten	nent under 37 C.F.R. 1.97 and 1.98.				
12. [X]	An assignment document for rec	ording. A separate cover sheet is compliance wi	th 37 C.F.R. 3.28 and 3.31 is included.			
13. [X]	A FIRST preliminary amendment. A SECOND OR SUBSEQUENT pr	eliminary amendment.				
14. []	A substitute specification.					
15. [X]	A change of power of attorney and/or address letter.					
16. [X]	Other items or information:					
	3 Sheets of Drawings					

CERTIFICATE OF MAILING

[X] Express Mail Mailing Label No. EL297132373US

X Authorthization Pursuant to 37 CFR § 1.136(a)(3) and to Charge Deposit Account

Date of Deposit January 12, 2001

I hereby certify that this paper and fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231.

Natale a. Manzo Typed Name



U.S. APPLICATION NO	(lf known_see375.F6	1.5)	INTERNATION PCT/EP00/046	IAL APPLICATION NO. 07	ATTORNEY'S DOCKET PHD 99,060	NUMBER
17 [] The following for	ees are submitted:				CALCULATIONS (PTO	USE ONLY)
BASIC NATIONAL FEE	(37 C.F.R. 1.492(A)(1)-(5)):				
Search Rep	ort has been prepared by	y the EF	O or JPO	\$940.00		
(37 C.F.R. 1	•			\$720.00		
No internat (37 C.F.R. 1 (37 C.F.R. 1	ional preliminary examina .482) but international se i.445(a)(2)	ation fe earch fe	e paid to USPTC e paid to USPTC	\$760.00		
Neither into 1.482) nor i paid to USF	ernational preliminary exa nternational search fee (3 PTO	aminatio 37 C.F.F	on fee (37 C.F.R. R. 1.445(a)(2))	\$970.00		
Internation (37 C.F.R. 1 Article 33(2	al preliminary examinatio I.482) and all claims satis !)-(4)	on fee pa fied pro	aid to USPTO ovisions of PCT	\$ 96.00		
	ENTER APPROPRIATE B	BASIC F	EE AMOUNT =		\$940.00	
Surcharge of \$130.00 from the earliest claim	for furnishing the oath or ned priority date (37 C.F.F	r declar R. 1.492	ation later than [(e)).	[] 20 [] 30 months	\$	
CLAIMS	NUMBER FILED	NUMB	BER EXTRA	RATE		
Total Claims	9 - 20 =			X \$ 18.00	\$	
Independent claims	1 - 3 =			X \$ 80.00	\$	
MULTIPLE DEPENDE applicable)	NT CLAIMS (if			+ \$270.00	\$	
	TOTAL OF A	BOVE C	ALCULATIONS	=	\$940.00	
Reductions by 1/2 for must also be filed (No	filing by small entity, if a te 37 C.F.R. 1.9, 1.27, 1.2	pplicab 8)	le. Verified Sma	II Entity Statement	\$	
·			SUE	BTOTAL =	\$940.00	
	0.00 for furnishing the Er est claimed priority date			than [] 20 [] 30 +	\$	
			TOTAL NATION	NAL FEE =	\$940.00	
Fee for recording the accompanied by an a	enclosed assignment (37 ppropriate cover sheet (3	7 C.F.R. 57 C.F.R	1.21(h)). The as . 3.28,3.31). \$40	ssignment must be .00 per property +	\$40.00	
			TOTAL FEES E	NCLOSED =	\$980.00	
					Amount to be refunded	\$
, ,					charged	\$940.00
a. [] A check in	the amount \$		to cover the abo	ve fees is enclosed.		
b. [X] Please charge my Deposit Account No.14-1270 in the amount of \$980.00 to cover the above fees. A duplicate copy of this sheet is enclosed.						
c. [X] The Commissioner is hereby authorized to charge any additional fee, with the exception of the Base Issue Fee, which may be required, or credit any overpayment to Deposit Account No. 14-1270. A duplicate copy of this sheet is enclosed.						
NOTE: Where an app filed and granted to r	propriate time limit under estore the application to	37 C.F. pending	R. 1.494 or 1.495 g status.	5 has not been met, a peti	tion to revive (37 C.F.R. 1	.137(a) or (b)) must be
SEND ALL CORRESP	PONDENCE TO:	(SIGNATURE)				
580 White Plains Roa	orth America Corporatioı	n		Michael E. Marion (NAME)	n	
Tarrytown, NY 10591 DATE OF MAILING:				32,266 (REGISTRATION	NUMBER)	

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09/743656 500 Rec'd PCT/PTO 1 2 JAN 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

FALKO BUSSE ET AL.

PHD 99,060

Serial No.

Group Art Unit

Filed: CONCURRENTLY

Examiner:

Title: SENSOR MATRIX

Commissioner for Patents Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Prior to calculation of the filing fee and examination, please amend the above-identified application as follows:

IN THE CLAIMS

Please amend the claims as follows:

Claim 4, line 1, delete "or 3"

Claim 5, line 1, delete "or 4"

Claim 6, line 1, change "one of the Claims 3 to 5" to --Claim 3--.

Claim 7, line 1, change "one of the Claims 3 to 5" to --Claim 3--.

Claim 8, line 1, change "one of the Claims 3 to 5" to --Claim 3--.

Claim 6, line 1, change "one of the Claims 1 to 5" to --Claim 1--.

REMARKS

The claims have been amended to delete multiple dependencies.

The within amendment is limited to the equivalent of cancellation of claims, and pursuant to MPEP §506, should be entered prior to calculation of the fee.

Respectfully submitted,

Michael/E. Marion, Reg. 32,266

Attorney

(914) 333-9641 January 8, 2001 - PHD 99.060

3/PRB

09/743656 500 Rec'd PCT/PTO 1 2 JAN 2001

25.02.2000

Sensor matrix.

The invention relates to an arrangement which includes light-sensitive or Xray-sensitive sensors which are arranged in a matrix of rows and columns and generate charges in dependence on the amount of incident radiation, each sensor including a respective photosensor element with an intrinsic storage capacitance or a storage capacitor connected parallel to the terminals thereof, as well as with a respective transistor, for each row of sensors there being provided at least one switching line via which the transistors can be activated so that the charges of the relevant activated sensors S can be read out simultaneously via read-out lines 8. The invention also relates to a method for operating the arrangement.

An arrangement of the kind set forth is known from EP 0 440 282 A2. Only small X-ray doses are incident on the sensors, notably in the case of X-ray applications. Consequently, the electrical charge generated in the photosensor elements in dependence on the incident radiation is also very small. The small amounts of charge often give rise to problems, because a large amount of noise is superposed on the signal read out. In order to mitigate this problem, the single sensor of the arrangement disclosed in EP 0 440 282 A2 has an as large as possible sensitive surface area in order to enhance the radiation sensitivity. In order to realize such large surfaces areas, each read-out line of the matrix is provided with only one amplifier which serves to amplify the signals read out from all sensors of this column.

It is an object of the invention to provide an improved arrangement of the kind set forth and to propose a method for operating said arrangement. More specifically,

depending on the mode of operation of the arrangement, the switching noise caused by the reading out of the sensors should be reduced and/or a higher image repeat rate, more stable operating conditions of the photosensor element, also in the case of large signals, as well as

an increased dynamic range of the photosensor element should be possible.

The described object is achieved on the basis of the idea to provide a further transistor which can be driven independently of the first transistor and co-operates with an additional capacitor in each sensor.

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More specifically, the object is achieved in an arrangement of the kind set forth in that each sensor includes a further transistor which is connected directly to the photosensor element and can be activated via at least one control line, that the two transistors of each sensor are connected in series, and that an electrode of a further capacitor is connected to the junction of the two transistors.

Both transistors of the sensor in a preferred embodiment of the invention are constructed as field effect transistors whose conductive channels are connected in series. Different modes of operation of the arrangement can be realized in dependence on the driving of the gate terminal of the field effect transistor connected to the photosensor element via the control line (control field effect transistor). The individual modes of operation follow from the method for operating the arrangements according to the invention as disclosed in the Claims 6 to 8.

The gate terminal of the field effect transistor (switching field effect transistor) which is connected in series with the control field effect transistor is connected in known manner to the switching line which is activated so as to read out the sensor.

In conformity with the known switching lines, for each row of sensors there may be provided at least one control line for controlling the further transistors, notably the control field effect transistors. However, it is alternatively possible to provide only one control line for driving all further transistors of the entire matrix.

For an effective reduction of the switching noise of the switching field effect transistor, in an embodiment of the invention the further capacitor is selected to be smaller than the intrinsic capacitance and/or the storage capacitor connected parallel to the photosensor element.

The constituent elements of each sensor can be arranged adjacently and/or one above the other on a thin-film substrate. The additional control field effect transistor may consist of amorphous silicon or polycrystalline silicon.

When the arrangement according to the invention operates in conformity with the characteristics of Claim 6, a continuous charge transfer to the further capacitor is achieved. When the voltage across the photosensor element is kept constant, the further capacitor is discharged instead of the storage capacitor when radiation is incident on the photosensor element. The term "charge pump" will be used hereinafter for this mode of operation of the control field effect transistor. Consequently, the further capacitor is charged again during the reading out via the read-out line. When the further capacitor is smaller than

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the storage capacitor, the switching noise which is proportional to the magnitude of the capacitor read out is reduced.

Because the voltage across the photosensor element is kept constant, the operation of the photosensor element is stable even in the case of large signals, because it continuously operates at the same working point. Moreover, a larger dynamic range of the sensor is obtained when the maximum voltage swing across the further capacitor is suitably chosen.

Controlled charge transfer between the storage capacitor and the further capacitor can be achieved by operation of the arrangement according to the invention in conformity with the characteristics of Claim 7. In such a mode of operation the charge is read out from the further capacitor while the radiation incident on the photosensor already produces new charges in the storage capacitor. To this end, the control field effect transistor temporarily operates as a charge pump.

The further capacitor, being smaller than the storage capacitor, exerts a reducing effect on the switching noise of the switching field effect transistor also in the case of controlled charge transfer. Because of the temporal overlap of the charge integration across the storage capacitor and the reading out of the further capacitor, this mode of operation allows for image repeat rates which are higher than can be achieved in arrangements known thus far.

In a mode of operation of the arrangement according to the invention in conformity with the characteristics of Claim 8, the storage capacitor is effectively enlarged by the further capacitor. The presence of a given bias voltage across the photosensor element, notably a photodiode, increases the dynamic range thereof.

An embodiment of the invention will be described in detail hereinafter with reference to Fig. 1 which shows a part of a sensor matrix.

Fig. 1 shows merely a part of an arrangement according to the invention with only one radiation-sensitive sensor S. All sensors of this embodiment are provided with n-channel field effect transistors. Evidently, field effect transistors having a different construction can also be used in the context of the invention.

A matrix consists in known manner of a multitude of, for example 2000 x 2000 sensors S which are arranged in rows and columns. The respective first sensors S of a row of the matrix together form the first column whereas the respective second sensors of each row together constitute the second column, etc.

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Each sensor S includes a photosensor element. When suitable semiconductors are used, the photosensor element itself may already be sensitive to X-rays. However, it may also be a light-sensitive photodiode 1 which receives light whenever X-rays are incident on a scintillator layer arranged thereabove. In the absence of a scintillator layer the arrangement is also suitable for the direct detection of light. Parallel to the terminals of the photodiode 1 there is connected a storage capacitor 2. The anode of the photodiode 1 and an electrode of the storage capacitor 2 are connected to a common electrode 9 which biases it with a negative DC voltage. The cathode of the photodiode 1 and the other electrode of the storage capacitor 2 are connected to a source terminal of a control field effect transistor 5. The drain terminal of the control field effect transistor 5 in its turn is connected to a source terminal of a switching field effect transistor 3.

When radiation is incident on the photodiode 1, charge carrier pairs (charges) are generated in the photodiode 1, with the result that the charged storage capacitor is partly discharged. The discharge is dependent on the number of photons incident on the photodiode 1. Each sensor can be individually read out by compensating the respective charge deficiency via the conductive channels of the field effect transistors 3, 5. To this end, a control line 6 and a switching line 7 are provided for each row of the sensor matrix. The switching line 7 is connected to the gate terminals of the switching field effect transistors 3 and the control line is connected to the gate terminals of the control field effect transistors 5 of the sensors S.

The switching and control lines 6, 7 thus activate the field effect transistors 3, 5 of the associated row of the matrix. They are driven, for example by means of a driver circuit which is known per se and not shown in the Figure, said driver circuit applying different analog control voltages to the lines 6, 7. The driver circuit serves to activate the rows of the sensor matrix successively in order to read out the charges stored in the sensors S.

A read-out line 8 is provided in known manner for each column of the matrix. All read-out lines 8 are connected to the drain terminals of the switching field effect transistors 3 of the sensors of the relevant column. An amplifier 11 is regularly associated with each read-out line 8, said amplifier integrating the charges row-wise flowing in the individual sensors S. The amplifiers 11 are preceded by an analog multiplexer (not shown) whose inputs are connected to the outputs of the amplifiers. The analog multiplexer converts the charges, arriving simultaneously and in parallel from each time one row of the matrix, into a serial signal which is presented on a serial output of the analog multiplexer so as to be processed further.

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An electrode of a further capacitor 4 is connected to the drain terminal of the control field effect transistor 5 and the source terminal of the switching field effect transistor 3, respectively, the other electrode 4a of said further capacitor also being connected to the general electrode 9 or a general electrode which is independent therefrom. In the context of the invention it is possible to insert one or more cascode transistors in the connection between the control field effect transistor 5 and the switching field effect transistor 3 of each sensor S in order to stabilize the drain voltage across the control field effect transistor 5.

In conjunction with the control field effect transistor 5, whose gate terminal is driven via the control line 6, the further capacitor 4 enables the following modes of operation for the individual sensors S of the arrangement according to the invention:

A. Continuous charge transfer

When a suitable voltage is applied to the gate terminal of the control field effect transistor 5 via the control line 6, this transistor can operate as a charge pump. A suitable voltage is a voltage which causes the control field effect transistor 5 to operate in the saturation range. The voltage present across the photodiode 1 and the storage capacitor 2 is thus kept constant.

When radiation is incident on the photodiode 1 in this mode of operation of the sensor S, the storage capacitor 2 of the photodiode 1 is no longer discharged, but the further capacitor 4 is discharged. When the switching field effect transistor 3 is then closed for the purpose of reading out, the further capacitor 4 is charged again during the reading out of the charge via the read-out line 8.

B. Controlled charge transfer

The charge transfer from the further capacitor 4 to the storage capacitor 2 is governed by the voltage on the control line 6. On the basis of this relationship it is possible to inhibit the charge transfer described sub A in given phases of the image data acquisition by applying a negative voltage (in relation to the voltage at the source terminal) to the gate terminal of the field effect transistor 5, via the control line 6, so that the control field effect transistor 5 is turned off.

When the charge transfer is inhibited, first only the storage capacitor 2 is discharged and subsequently it is charged again from the further capacitor 4. The compensation of the charge across the further capacitor 4 via the activated switching field effect transistor 3 and the read-out line 8 can then take place when radiation is already incident again on the photodiode 1 and the capacitor 2 is discharged.

C. Increasing the storage capacitor

When a large positive voltage, in comparison with the voltage at the source terminal, is applied to the gate terminal of the control field effect transistor 5, the channel thereof becomes conductive. When this voltage is sustained, a continuous connection is established between the storage capacitor 2 and the further capacitor 4. The overall capacitance connected parallel to the photodiode 1 is thus increased by the additional capacitance 4. The dynamic range of the photodiode 1 can thus be increased for a given bias voltage.

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(3, 5).

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CLAIMS:

1. An arrangement which includes light-sensitive or X-ray-sensitive sensors (S) which are arranged in a matrix of rows and columns and generate charges in dependence on the amount of incident radiation, each sensor (S) including a respective photosensor element (1) with an intrinsic storage capacitance and/or a storage capacitor (2) connected parallel to the terminals thereof, as well as with a respective transistor (3), for each row of sensors there being provided at least one switching line (7) via which the transistors (3) can be activated so that the charges of the relevant activated sensors (S) can be read out simultaneously via read-out lines (8), characterized in that each sensor (S) includes a further transistor (5) which is connected directly to the photosensor element (1) and can be activated via at least one control line (6), that the two transistors (3, 5) of each sensor (S) are connected in series, and that an electrode of a further capacitor (4) is connected to the junction of the two transistors

2. An arrangement as claimed in Claim 1, characterized in that the further transistors (5) can be activated via at least one control line (6) per row of sensors or one control line for the entire matrix.

3. An arrangement as claimed in Claim 2, characterized in that both transistors (3, 5) of each sensor are constructed as field effect transistors whose conductive channels are connected in series, the gate terminal of the control field effect transistor (5) connected to the photosensor element (1) being connected to the control line (6) whereas the gate terminal of the series-connected switching field effect transistor (3) is connected to the switching line (7).

4. An arrangement as claimed in Claim 1 or 3,

characterized in that the further capacitor (4) is smaller than the storage capacitor (2).

- 5. An arrangement as claimed in Claim 3 or 4,
- 5 characterized in that the constituent elements of the sensor (5) are arranged one above the other and/or adjacent one another on a thin-film substrate.
- 6. A method for operating an arrangement as claimed in one of the Claims 3 to 5, characterized in that the voltage present at the gate terminal of the control field effect transistor (5) of each sensor (S) is chosen to be such that it keeps the voltage across the photosensor element (1) constant and hence operates as a charge pump.
 - 7. A method for operating an arrangement as claimed in one of the Claims 3 to 5, characterized in that the conductive channel of the control field effect transistor (5) of each sensor (6) is blocked during the charge integration in the storage capacitor (2) of the radiation incident on the photosensor element (1), and that the charge is subsequently transferred to the further capacitor (4) by the unblocking of the conductive channel and is subsequently read out therefrom by the unblocking of the conductive channel of the switching field effect transistor (3).
- 8. A method for operating an arrangement as claimed in one of the Claims 3 to 5, characterized in that the voltage, present at the gate terminal of the control field effect transistor (5), of each sensor (S) is chosen to be so high that the conductive channel thereof directly connects the storage capacitor (2) to the further capacitor (4).
- 30 9. The use of the arrangement claimed in one of the Claims 1 to 5 in an X-ray examination apparatus.

ABSTRACT:

The invention relates to an arrangement with light-sensitive or X-ray-sensitive sensors which are arranged in rows and columns of a matrix and generate charges in dependence on the amount of incident radiation, each sensor including a photosensor element with an intrinsic storage capacitor and/or a storage capacitor connected parallel to its terminals, and also a respective transistor; it also includes at least one switching line for each row of sensors via which the transistors can be activated so that the charges of the relevant activated sensors S can be read out simultaneously via read-out lines 8 in order to ensure that, in conformity with the relevant mode of operation of the arrangement, the switching noise caused by the reading out of the sensors is reduced and/or a higher image repeat rate or more stable operating conditions for the photosensor element, also in the case of large signals, as well as an increase of the dynamic range of the photosensor element become possible in that each sensor S includes a further transistor 5 which is connected directly to the photosensor element 1 and can be activated via at least one control line, both transistors 3, 5 of each sensor S being connected in series and an electrode of a further capacitor 4 being connected to the junction of the two transistors 3, 5.

Fig. 1

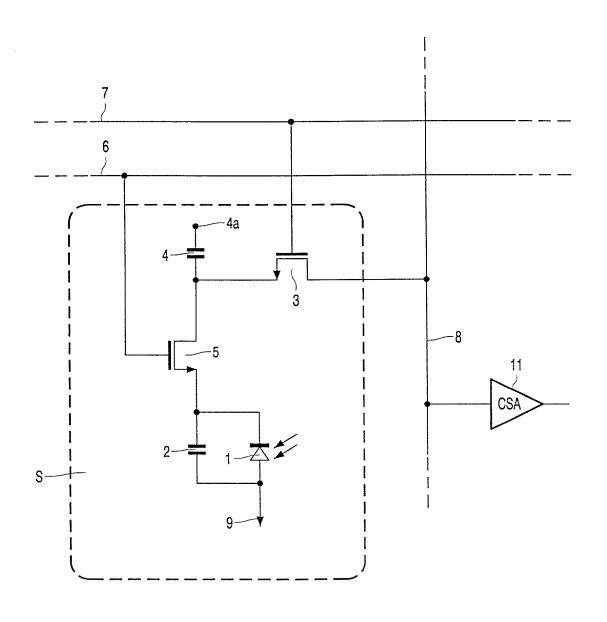


FIG. 1

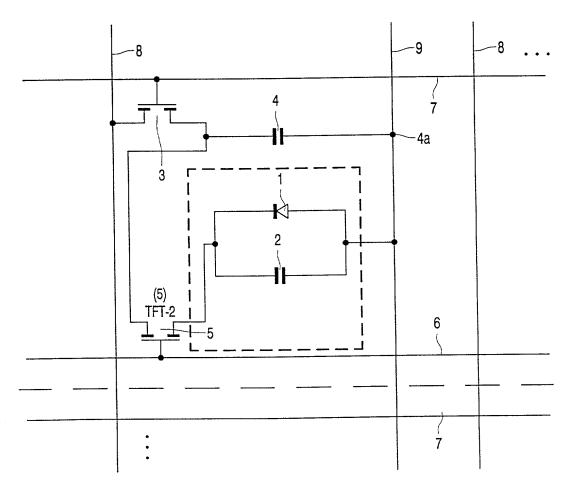
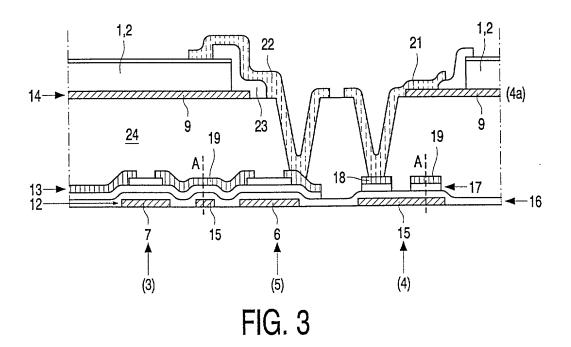
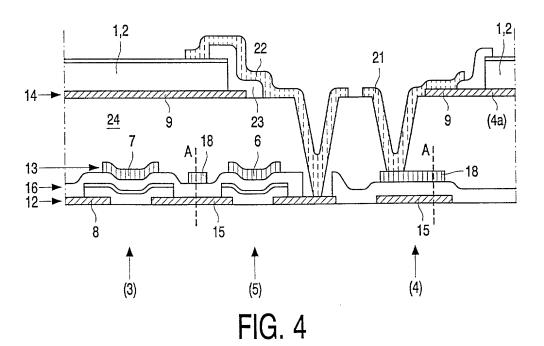


FIG. 2

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COMBINED DECLARATION R PATENT APPLICATION AND POWER TORNEY (includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER PHD 99.060 US

As a below named inventor, I	nereby declare that:						
My residence, post office addr	ess and citizenship are as stated	next to my name.					
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: Sensor Matrix the specification of which (check only one item below):							
is attached hereto.							
☐ was filed as United States	application						
	<u></u>						
on							
and was amended							
on							
X was filed as PCT internation	onal application						
Number PCT/ EP00/046							
on 17 May 2000							
Ou							
and was amended under PC	T Article 19						
on			(if applicable)				
claims, as amended by any a	amendment referred to above.	nts of the above-identified specificati ial to the examination of this applica					
Title 37, Code of Federal Re	gulations, § 1.56(a).						
I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:							
PRIOR FOREIGN/PCT APP	LICATION(S) AND ANY PRIORI	TY CLAIMS UNDER 35 U.S.C. 119	:				
COUNTRY	APPLICATION NUMBER	DATE OF FILING DAY, MONTH, YEAR	PRIORITY CLAIMED UNDER 35 USC 119				
Germany	19922650.4	18 May 1999	YES				
		U.S. DEPARTMENT OF COMMERCE	-Patent and Trademarks Office (July 1994)				

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER

PHD 99.060 US

As a below named inventor, I h	ereby declare that:					
My residence, post office addre	ess and citizenship are as state	ed next to my name.				
I believe I am the original, first a plural names are listed below) of entitled: Sensor Matrix the specification of which (chec	of the subject matter which is	name is listed below) or an original, firs claimed and for which a patent is sougl	t and joint inventor (if ht on the invention			
is attached hereto.		,				
was filed as United States a	pplication					
Serial No.						
on						
and was amended						
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IVI Sind an DOT intermediate	al a cult att c					
was filed as PCT internation						
Number PCT/ EP00/04607	/					
on 17 May 2000 and was amended under PCT A	Article 19		•			
			(if applicable)			
on <u> </u>			(if applicable)			
I hereby state that I have review claims, as amended by any am		nts of the above-identified specification	n, including the			
I acknowledge the duty to discle Title 37, Code of Federal Regul		rial to the examination of this applicatio	on in accordance with			
I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:						
PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:						
COUNTRY	APPLICATION NUMBER	DATE OF FILING DAY, MONTH, YEAR	PRIORITY CLAIMED UNDER 35 USC 119			
Germany	19922650.4	18 May 1999	YES			
		U.S. DEPARTMENT OF COMMERCE -Pa	atent and Trademarks Office			

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (includes Reference to PCT International Applications)

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		U.S. DEPARTMENT OF COMMERC	
Germany	19922650.4	18 May 1999	YES
COUNTRY	APPLICATION NUMBER	DATE OF FILING DAY, MONTH, YEAR	PRIORITY CLAIMED UNDER 35 USC 119
<u> </u>		ITY CLAIMS UNDER 35 U.S.C. 1	19:
States of America listed be any PCT international appl	elow and have identified below any lication is applicated by the lication (s) designating at least one	States Code, § 119 of any foreign on(s) designating at least one cour y foreign application(s) for patent of country other than the United Sta f the application(s) of which priorit	or inventor's certificate or
I acknowledge the duty to Title 37, Code of Federal F	disclose information which is mate Regulations, § 1.56(a).	erial to the examination of this app	lication in accordance with
I hereby state that I have r claims, as amended by an	reviewed and understand the cont by amendment referred to above.	ents of the above-identified specifi	,
on #			(if applicable)
and was amended under I	PCT Article 19		
on 17 May 2000			
Number PCT/ EP00/0)4607		
◯ was filed as PCT intern	national application		
on			
and was amended			
o n			
Serial No.			
was filed as United Sta	ates application		
is attached hereto.			
entitled: Sensor Matr	Blow) of the subject matter which is	e name is listed below) or an origir s claimed and for which a patent is	nal, first and joint inventor (s sought on the invention
My residence, post office	address and citizenship are as st	ated next to my name.	
As a below named invent	or, I hereby declare that:		

Com	denic	Déclara	ation Fo	or Patent	Application	and Po	ower of	Attorney	(Continued)
(includ	ies Re	eference	to PCT	Internatio	nal Application	ons)			

Attorneys Docket Number

PHD 99.060 US

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) abnd/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)

Algy Tamoshunas Reg. No. 27,677 Jack E. Haken, Reg. No. 26,902 Direct Telephone Calls to: (name and telephone number) (914)332-0222

			' '	
	FULL NAME OF INVENTOR	FAMILY NAME BUSSE	FIRST GIVEN NAME Falko	SECONDE GIVEN NAME
201	RESIDENCE & CITIZENSHIP	CITY Aachen	STATE OR FOREIGN COUNTRY Germany	COUNTRY OF CITIZENSHIP Germany
	POST OFFICE ADDRESS	POST OFFICE ADDRESS Drei-Rosen-Straße 15	CITY 52066 Aachen	STATE & ZIP CODE/COUNTRY Germany
	FULL NAME OF INVENTOR	FAMILY NAME OVERDICK	FIRST GIVEN NAME Michael	SECONDE GIVEN NAME
202	RESIDENCE & CITIZENSHIP	CITY Bonn	STATE OR FOREIGN COUNTRY Germany	COUNTRY OF CITIZENSHIP Germany
	POST OFFICE ADDRESS	POST OFFICE ADDRESS Eislebenstraße 3	53125 Bonn	STATE & ZIP CODE/COUNTRY Germany
	FULL NAME OF INVENTOR	FAMILY NAME RÜTTEN	FIRST GIVEN NAME Walter	SECONDE GIVEN NAME
203	RESIDENCE & CITIZENSHIP	CITY Linnich	STATE OR FOREIGN COUNTRY Germany	COUNTRY OF CITIZENSHIP Germany
	POST OFFICE ADDRESS	POST OFFICE ADDRESS Brunnenstraße 26	52441 Linnich	STATE & ZIP CODE/COUNTRY Germany
	FULL NAME OF INVENTOR	FAMILY NAME POWELL	FIRST GIVEN NAME Martin John	SECONDE GIVEN NAME
204	RESIDENCE & CITIZENSHIP	CITY Horley	STATE OR FOREIGN COUNTRY United Kingdom	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS 18 Middlefield	Horley, Surrey RH6 9XP	STATE & ZIP CODE/COUNTRY United Kingdom
	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECONDE GIVEN NAME
205	RESIDENCE & CITY		STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECONDE GIVEN NAME
206	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true: and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 if Title 18 of the United states Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
DATE	DATE	DATE
SIGNATURE OF INVENTOR 204	SIGNATURE OF INVENTOR 205	SIGNATURE OF INVENTOR 206
1 /2 //		
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DATE 7 December 2000	DATE	DATE
DATE 7 December 2000	DATE	DATE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

FALKO BUSSE ET AL.

PHD 99,060

Serial No.

Group Art Unit

Filed: CONCURRENTLY

Examiner:

Title: SENSOR MATRIX Commissioner for Patents Washington, D.C. 20231

APPOINTMENT OF ASSOCIATES

Sir:

The undersigned Attorney of Record hereby revokes all prior appointments (if any) of Associate Attorney(s) or Agent(s) in the above-captioned case and appoints:

JOHN VODOPIA

(Registration No. 36,299) and

MICHAEL E. MARION

(Registration No. 32,266)

c/o U.S. PHILIPS CORPORATION, Intellectual Property Department, 580 White Plains Road, Tarrytown, New York 10591, his Associate Attorney(s)/Agent(s) with all the usual powers to prosecute the above-identified application and any division or continuation thereof, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

ALL CORRESPONDENCE CONCERNING THIS APPLICATION AND THE LETTERS PATENT WHEN GRANTED SHOULD BE ADDRESSED TO THE UNDERSIGNED ATTORNEY OF RECORD.

Respectfully,

Jack E. Haken, Reg. 26,902

Dated at Tarrytown, New York this 8^{TH} day of January 2001.

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Comb (includ	ined Declaration I	For Patent Application a	and Power of A	Attorney (Continued)		Attorneys Docket Number PHD 99.060 US
POWE all bus	ER OF ATTORNE iness in the Patent a	Y: As a named inventor, land Trademark Office con	hereby appoint nected therewith	the following attorney(s) abnd. . (List name and registration n	/or agent(s) to p umber)	rosecute this application and transact
Algy Jack	Tamoshunas E. Haken, R	s Reg. No. 27,677 eg. No. 26,902	2		Direct Telepho (name and tele (914)332-02	ephone number)
	FULL NAME OF INVENTOR	FAMILY NAME BUSSE		FIRST GIVEN NAME Falko		SECONDE GIVEN NAME
201	RESIDENCE & CITIZENSHIP	CITY Aachen		STATE OR FOREIGN COUNTY	NTRY	COUNTRY OF CITIZENSHIP Germany
	POST OFFICE ADDRESS	POST OFFICE ADDRESS Drei-Rosen-Str		CITY 52066 Aachen		STATE & ZIP CODE/COUNTRY Germany
0	FULL NAME OF INVENTOR	FAMILY NAME OVERDICK		FIRST GIVEN NAME Michael		SECONDE GIVEN NAME
202	RESIDENCE & CITIZENSHIP	CITY Bonn		STATE OR FOREIGN COUNTY	VIRY	COUNTRY OF CITIZENSHIP Germany
ļ	POST OFFICE ADDRESS	POST OFFICE ADDRES Eislebenstraße		53125 Bonn		STATE & ZIP CODE/COUNTRY Germany
)	FULL NAME OF INVENTOR	FAMILY NAME RÜTTEN		FIRST GIVEN NAME Walter		SECONDE GIVEN NAME
203	RESIDENCE & CITIZENSHIP	CITY Linnich		STATE OR FOREIGN COULD	NTRY	COUNTRY OF CITIZENSHIP Germany
	POST OFFICE ADDRESS	POST OFFICE ADDRES		CITY 52441 Linnich		STATE & ZIP CODE/COUNTRY Germany
4	FULL NAME OF INVENTOR	FAMILY NAME POWELL		FIRST GIVEN NAME Martin John		SECONDE GIVEN NAME
204	RESIDENCE & CITIZENSHIP	Horley		STATE OR FOREIGN COUL United Kingdom	36X	COUNTRY OF CITIZENSHIP
g u	POST OFFICE ADDRESS	18 Middlefield	SS	спү Horley, Surrey Rh	/ 16 9XP	STATE & ZIP CODE/COUNTRY United Kingdom
25 1 14 1 14 1 14 1	FULL NAME OF INVENTOR	FAMILY NAME		FIRST GIVEN NAME		SECONDE GIVEN NAME
205	CITIZENSHIP	CITY	20	STATE OR FOREIGN COU	NTRY	COUNTRY OF CITIZENSHIP STATE & ZIP CODE/COUNTRY
244 2256 2476	POST OFFICE ADDRESS FULL NAME OF	POST OFFICE ADDRES		FIRST GIVEN NAME		SECONDE GIVEN NAME
206	INVENTOR RESIDENCE &	CITY		STATE OR FOREIGN COU	NTRY	COUNTRY OF CITIZENSHIP
200	CITIZENSHIP POST OFFICE ADDRESS	POST OFFICE ADDRE	SS	CITY		STATE & ZIP CODE/COUNTRY
	ADDRESS					
true: a impriso	nd further that these	e statements were made v der section 1001 if Title 18	vith the knowledg	ge that willful false statements	and the like so	information and belief are believed to be made are punishable by fine or nts may jeopardize the validity of the
	TURE OF INVENT			OF INVENTOR 202		URE OF INVENTOR 203
7	Falso Bu	inl	Mil	ind Overdids	Wa	W Rel-
DATE 7 December 2000			DATE 7 December 2000 SIGNATURE OF INVENTOR 205		DATE SIGNAT	7 December 2000 TURE OF INVENTOR 206

DATE

U.S. DEPARTMENT OF COMMERCE- Patent and Trademarks Office (July 1994)

DATE



	ined Declaration I es Reference to PC		PHD 99.060 US			
OWI	ER OF ATTORNE	Y: As a named inventor, I and Trademark Office con-	hereby appoint	the following attorney(s) abn . (Liet name and registration	d/or agent(s) to po number)	osecute this application and transact
Λ I σ : -	Tamochuros	Reg. No. 27,677			Direct Telepho	
		eg. No. 26,902				phone number)
Jack	E. Haken, N	eg. 140. 20,302			(914)332-02	.22
	FULL NAME OF	FAMILY NAME		FIRST GIVEN NAME		SECONDE GIVEN NAME
1	INVENTOR	BUSSE		Falko		
201	RESIDENCE &	CITY		STATE OR FOREIGN CO	JNTRY	COUNTRY OF CITIZENSHIP
ļ	CITIZENSHIP	Aachen		Germany		Germany STATE & ZIP CODE/COUNTRY
	POST OFFICE ADDRESS	POST OFFICE ADDRES		52066 Aachen		Germany
			abe 15	FIRST GIVEN NAME		SECONDE GIVEN NAME
	FULL NAME OF INVENTOR	FAMILY NAME OVERDICK		Michael		SEGONDE SITEIT (PARE
	RESIDENCE &	CITY		STATE OR FOREIGN CO	UNTRY	COUNTRY OF CITIZENSHIP
02	CITIZENSHIP	Bonn		Germany		Germany
	POST OFFICE	POST OFFICE ADDRES	SS	CITY		STATE & ZIP CODE/COUNTRY
	ADDRESS	Eislebenstraße		53125 Bonn		Germany
	FULL NAME OF	FAMILY NAME		FIRST GIVEN NAME	 	SECONDE GIVEN NAME
	INVENTOR	RÜTTEN		Walter		
.03	RESIDENCE &	CITY		STATE OR FOREIGN CO	UNTRY	COUNTRY OF CITIZENSHIP
	CITIZENSHIP	Linnich		Germany		Germany
	POST OFFICE	POST OFFICE ADDRES	SS	CITY		STATE & ZIP CODE/COUNTRY
	ADDRESS	Brunnenstraße	26	52441 Linnich		Germany
	FULL NAME OF	FAMILY NAME		FIRST GIVEN NAME		SECONDE GIVEN NAME
	INVENTOR	POWELL		Martin		John
04	RESIDENCE &	CITY		STATE OR FOREIGN CO		COUNTRY OF CITIZENSHIP
	CITIZENSHIP	Horley		United Kingdom	OPX.	Great Britain /
	POST OFFICE	POST OFFICE ADDRESS		CITY	ייים מצים	STATE & ZIP CODE/COUNTRY
	ADDRESS	18 Middlefield		Horley, Surrey R	H6 9XP	United Kingdom SECONDE GIVEN NAME
	FULL NAME OF INVENTOR	FAMILY NAME		FIRST GIVEN NAME		SECONDE GIVEN NAME
205	RESIDENCE &	CITY		STATE OR FOREIGN CO	UNTRY	COUNTRY OF CITIZENSHIP
.05	CITIZENSHIP			CITY		STATE & ZIP CODE/COUNTRY
	POST OFFICE ADDRESS	POST OFFICE ADDRES	SS	CITY		STATE & ZIP CODE/COONTRT
	FULL NAME OF	FAMILY NAME		FIRST GIVEN NAME		SECONDE GIVEN NAME
	INVENTOR					
206	RESIDENCE &	CITY		STATE OR FOREIGN COUNTRY		COUNTRY OF CITIZENSHIP
-	CITIZENSHIP	POST OFFICE ADDRE	00	CITY		STATE & ZIP CODE/COUNTRY
	POST OFFICE ADDRESS	FOST OFFICE ADDRES	33	0111		STATE & ZIII SODE COOKINI
here	by declare that all s	tatements made herein of i	my own knowled	ige are true and that all state	ments made on in	formation and belief are believed to b
rue: a	and further that thes	e statements were made v der section 1001 if Title 18	vith the knowled I of the I Inited s	ge that willful false statement tates Code, and that such wi	ts and the like so : Ilful false stateme:	made are punishable by fine or nts may jeopardize the validity of the
	ation or any patent		. C. ale office a	The second server server second server		
	ATURE OF INVENT	OP 201	SIGNATURE (OF INVENTOR 202	SIGNAT	URE OF INVENTOR 203
ng N	ATURE OF INVENT	UN 201	SIGNATURE (21 H44F141 OH 202	SIGNAT	J J. M. T J. 1200
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		OR 204	SIGNATURE	OF INVENTOR 205	SIGNA	URE OF INVENTOR 206
		OR 204	SIGNATURE	of Inventor 205	SIGNA	URE OF INVENTOR 206
		FOR 204	SIGNATURE	OF INVENTOR 205	SIGNAT	URE OF INVENTOR 206

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JUN 0 7 2001

Combined Declaration For Patern Application and Power of Attorney (Continued) (Includes Reference of PCTM) in all Applications)

Attorneys Docket Number PHD 99.060 US

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) abnd/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)

Algy Tamoshunas Reg. No. 27,677 Jack E. Haken, Reg. No. 26,902 Direct Telephone Calls to: (name and telephone number) (914)332-0222

	L. 1 1011(011), 1 (.	· ·	(314)552-6222
	FULL NAME OF INVENTOR	FAMILY NAME BUSSE	FIRST GIVEN NAME Falko	SECONDE GIVEN NAME
201	RESIDENCE & CITIZENSHIP	CITY Aachen	STATE OR FOREIGN COUN Germany	Germany
	POST OFFICE ADDRESS	POST OFFICE ADDRESS Drei-Rosen-Straße 15	52066 Aachen	STATE & ZIP CODE/COUNTRY Germany
	FULL NAME OF INVENTOR	FAMILY NAME OVERDICK	FIRST GIVEN NAME Michael	SECONDE GIVEN NAME
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	FULL NAME OF INVENTOR	FAMILY NAME POWELL	FIRST GIVEN NAME Martin John	SECONDE GIVEN NAME
204	RESIDENCE & CITY CITIZENSHIP Horley		STATE OR FOREIGN COUL United Kingdom	
	POST OFFICE ADDRESS	POST OFFICE ADDRESS 18 Middlefield	CITY Horley, Surrey RI	STATE & ZIP CODE/COUNTRY United Kingdom
	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECONDE GIVEN NAME
205	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COU	NTRY COUNTRY OF CITIZENSHIP STATE & ZIP CODE/COUNTRY
	POST OFFICE ADDRESS FULL NAME OF	POST OFFICE ADDRESS FAMILY NAME	CITY FIRST GIVEN NAME	SECONDE GIVEN NAME
	INVENTOR		STATE OR FOREIGN COU	
206	RESIDENCE & CITIZENSHIP POST OFFICE	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
	ADDRESS	·		

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true: and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 if Title 18 of the United states Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
Faiso Buni	Midul Overdille	Wall Elle
DATE 7 December 2000	DATE 7 December 2000	DATE 7 December 2000
SIGNATURE OF INVENTOR 204	SIGNATURE OF INVENTOR 205	SIGNATURE OF INVENTOR 206
DATE	DATE	DATE
	LLC DEDARTMENT O	COMMEDCE Patent and Trademarks Office

S. DEPARTMENT OF COMMERCE- Patent and Tradentarks Office

(July 1994)